




AccessMap and Global Open Sidewalks

Nick Bolten & Anat Caspi
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Hello!

I am Nick Bolten

I live a double life:

- I'm a PhD researcher in synbio  
- I work on AccessMap / OpenSidewalks 

Hello!



TCAT

The Taskar Center for
Accessible Technology



I am Anat Caspi

I direct the Taskar Center for Accessible Technology at UW (a CS&E initiative)

- I work on AccessMap / OpenSidewalks
- I am broadly interested in ways in which collaborative commons can incentivize rapid development of accessible technologies.

An aerial, black and white photograph of a busy city intersection. A large bus is stopped at a crosswalk on the left. Several cars are visible, including a white sedan in the center and a dark SUV on the right. Pedestrians are crossing the street at various points. The scene is framed by four bright green L-shaped corner brackets. The text "Mapping The Built Environment: Auto roads get all the attention" is overlaid in the center.


Mapping The Built Environment:

Auto roads get all the attention

An aerial, grayscale photograph of a city intersection. A thick cyan arc curves across the top right of the image. Four bright yellow L-shaped markers are positioned around the central text. The intersection features crosswalks, traffic lights, and various vehicles including cars, buses, and a bicycle. Pedestrians are visible on the sidewalks. A street sign for 'Fourth' is visible in the lower center.

Mapping The Built Environment:

Auto roads get all the attention

An aerial photograph of a city street intersection. A wide crosswalk with white stripes crosses the road. Several cars are visible, including a dark sedan and a blue SUV. Pedestrians are walking on the sidewalks and crossing the street. A person is riding a bicycle on the left side of the crosswalk. The scene is captured from a high angle, showing the layout of the street and surrounding buildings.

Mapping The Built Environment: What about the sidewalk?

Outline

- Background: motivated by automated routing-AccessMap
- Problem statement
 - Where should (sidewalk) data live (stakeholders, etc)?
 - What kinds of data do we need to record?
 - What is the data model (specification)?
 - How do we populate the data on a global scale?
- Our approach
 - OpenStreetMap
 - Lots (at least individual sidewalks and curb ramps)
 - TBD!
 - With our own new tool(s)! e.g. OSM Tasking Manager fork.
- Wrap-up

1.

Background: AccessMap

Why mapping
the built
environment
matters

Kevin's Story

“Using a tool like directions on Google Maps doesn't really help me get around. Actually sometimes this does more harm than good. I'm sent down streets I can't cross, or up inclines that are impossible to climb. It can be deeply frustrating.”



54.5 million

People in the USA need
assistive devices or have
trouble walking more than a
quarter mile.

U.S. Census Bureau, *Americans With Disabilities:*
2010, issued July 2012

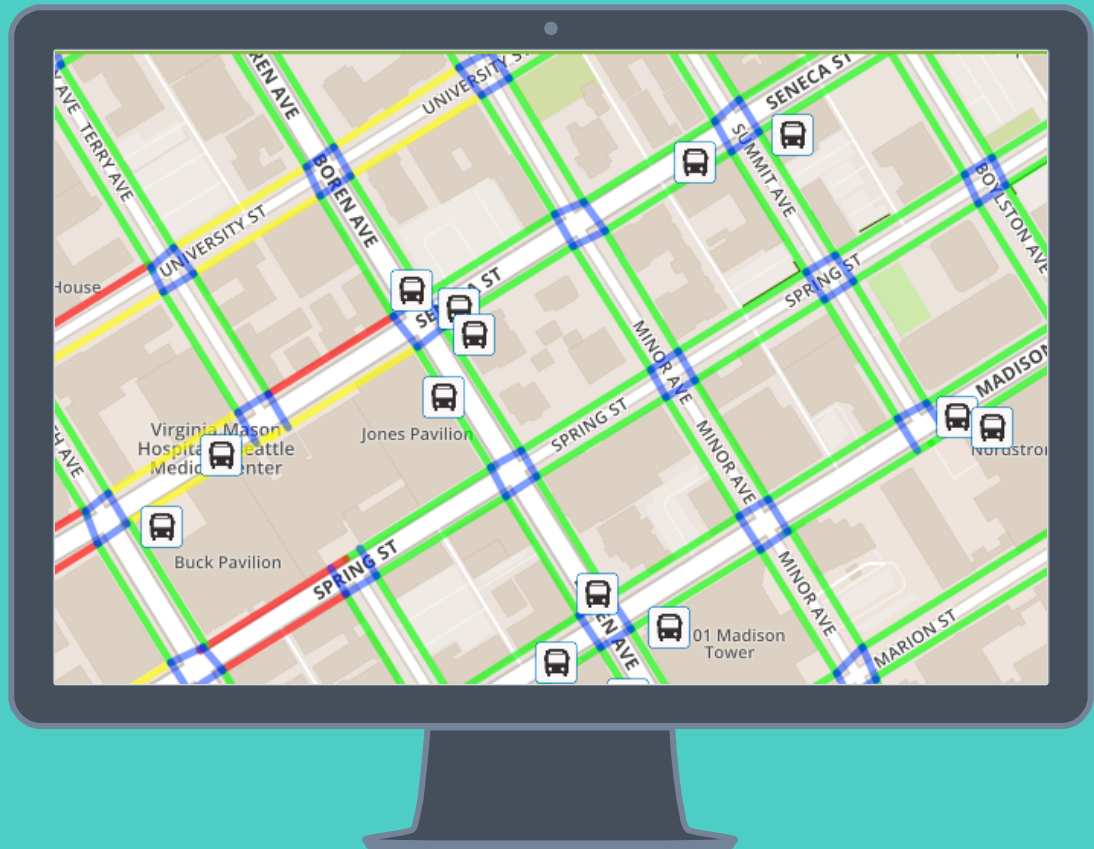


Current Accessibility Resources

Static maps that are:

- Cluttered
- Complex
- Out of date
- Non-routable



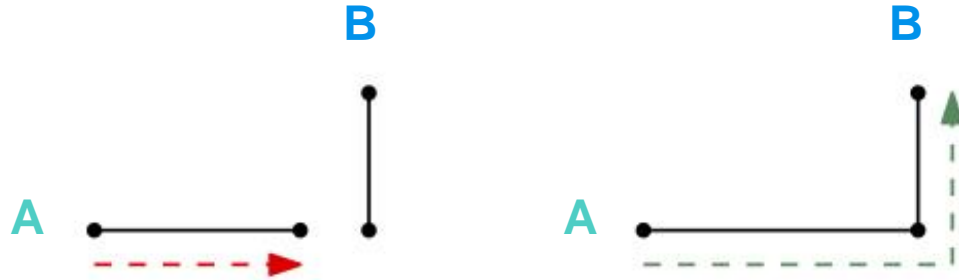


AccessMap Seattle

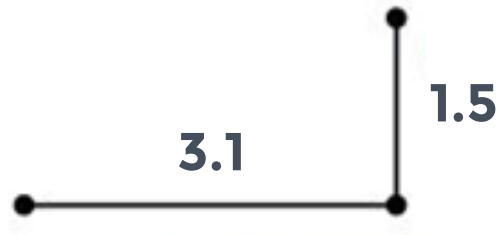
Displays accessibility information about every sidewalk in the city of Seattle using open data on sidewalks, curb ramps, and construction from SDOT, elevation from the USGS, bus stops from OneBusAway.

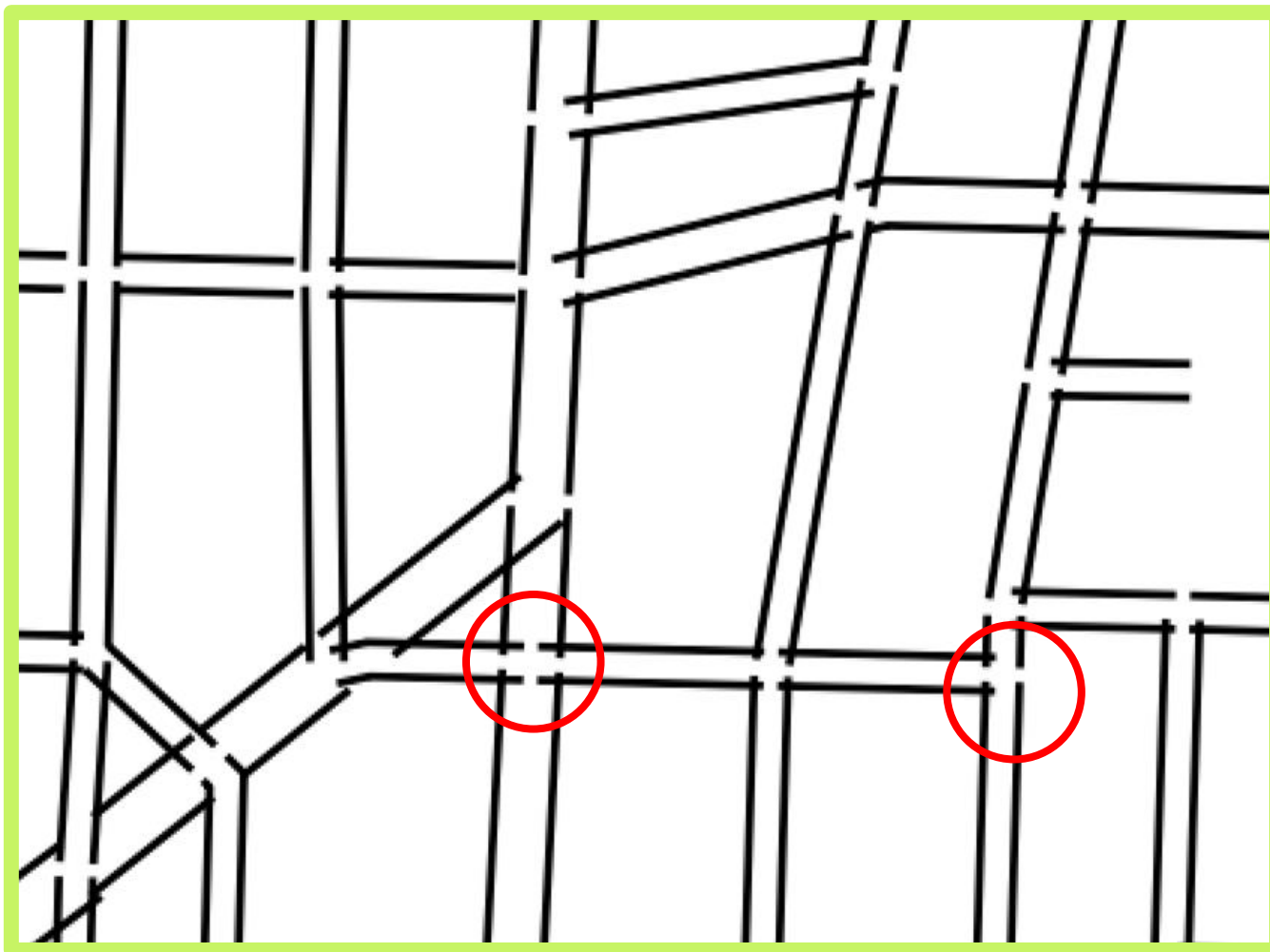
Routing requires two things

Connected graph edges



Costs for traveling on an edge

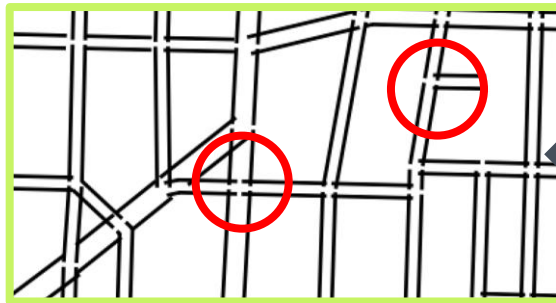




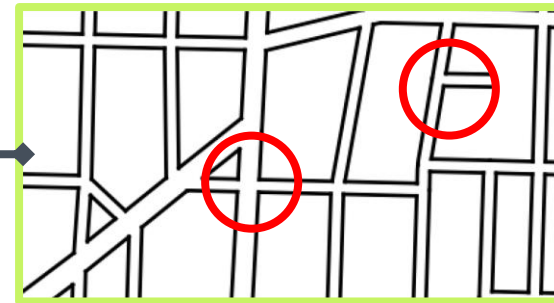
But the data looks like this

DSSG 2015: Routable Sidewalks

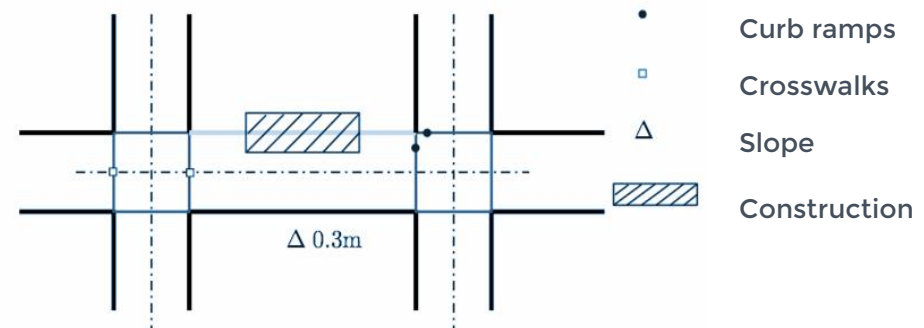
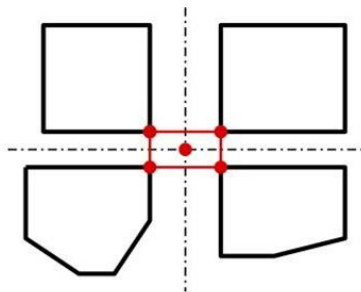
Algorithms to clean 45,000+ sidewalk segments



Generated crossings



Annotated sidewalks



Project Leads:

Nick Bolten
 Anat Caspi

ALVA students:

Nick Krasnoselsky
 Doris Layman

DSSG fellows:

Amir Amini Yun Hao
 Vaishnavi Ravichandran Andre Stephens

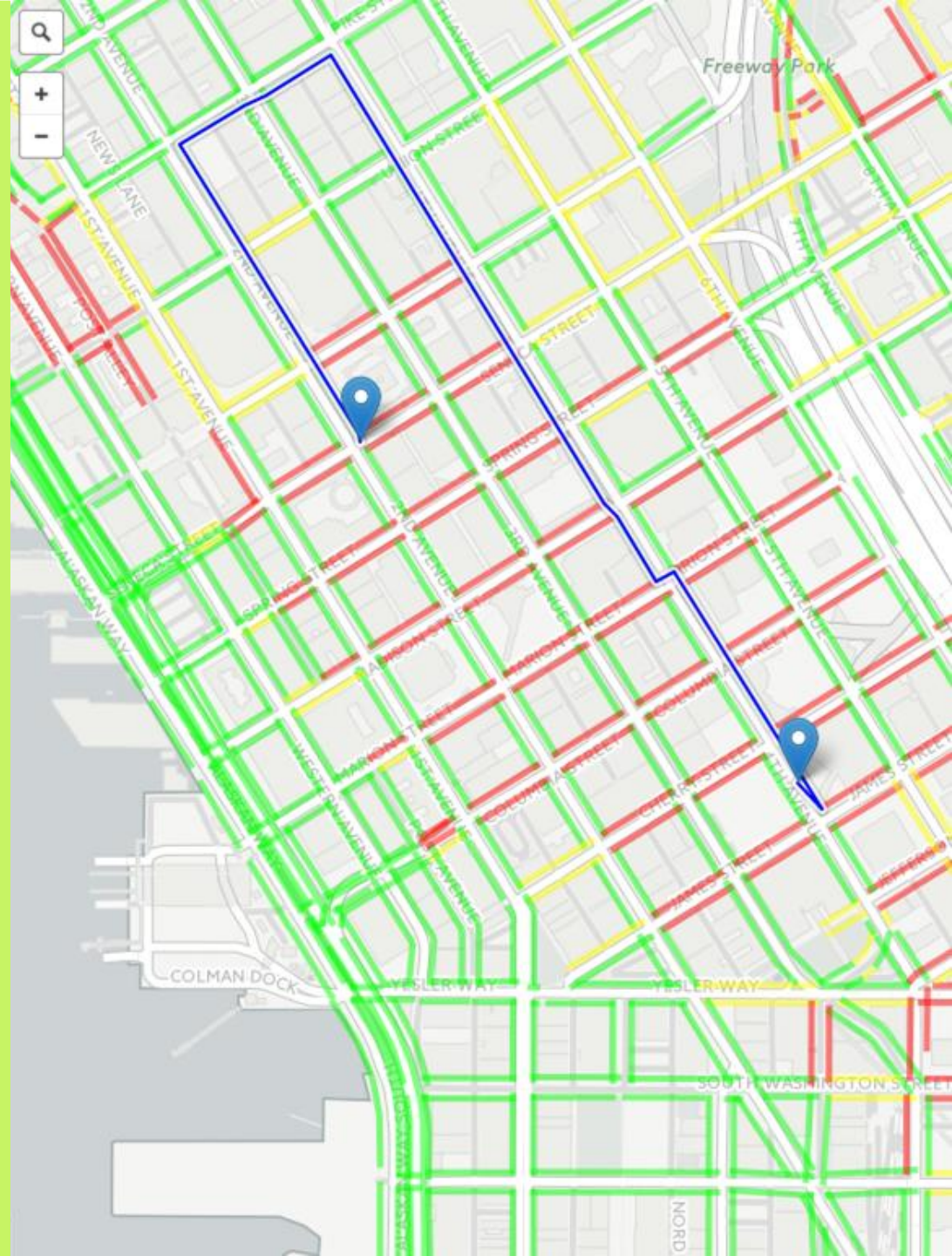
Data Scientists:

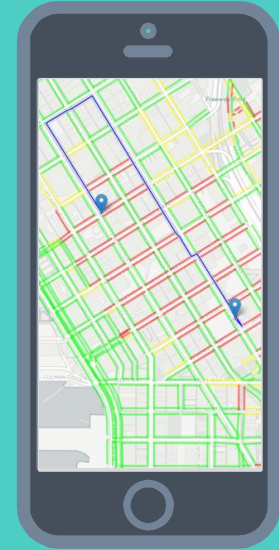
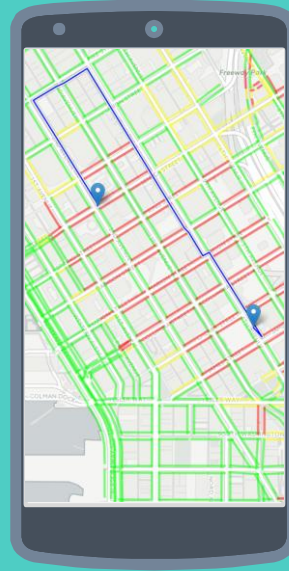
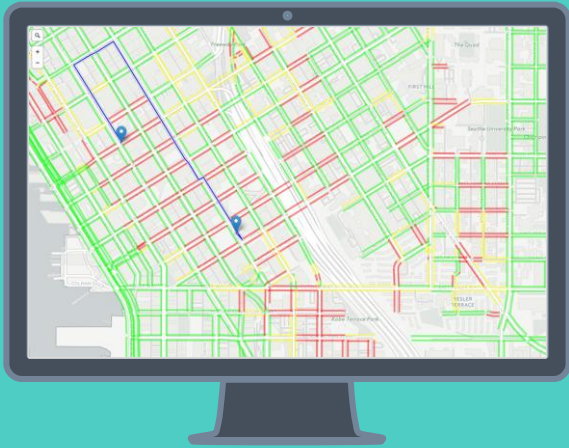
Anthony Arendt
 Jake Vanderplas

Routing!

- Minimizes steepness and distance over all possible paths
- Note: NOT the shortest path!

Cost function needs improvement. Please fill out our survey!





As a result

We're able to start releasing apps that help people with limited mobility find routes tailored to their needs

2.

Problem Statement

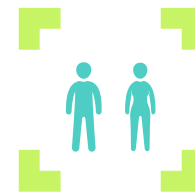
- A home for data
- Needed data
- The data model
- Getting the data

Where should this kind of data live?



Municipal government

Has to keep records to do planning, including new construction and ADA compliance.



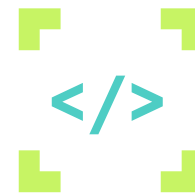
Everyone

Owens this data - it's public domain. We should be able to access it and give feedback when it's incorrect.



Researchers

Need high-quality, up to date data for their analysis to be accurate



Software Developers

Need accurate, reliable sources of data, and prefer not to DIY everything.

Where should this kind of data live?

OpenStreetMap (OSM)!



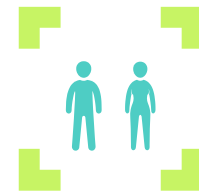
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Everyone

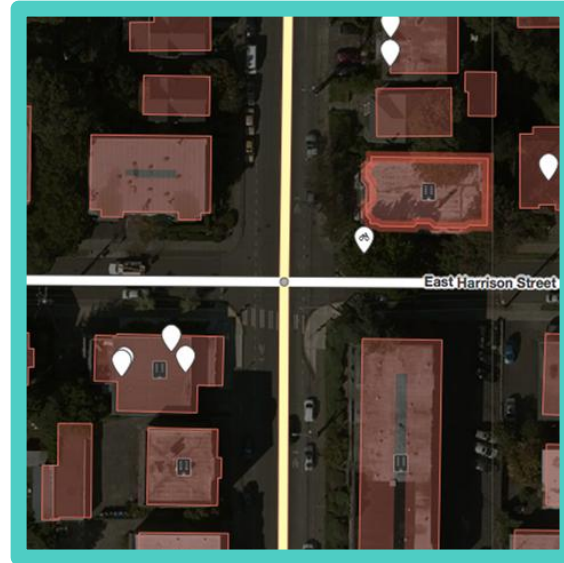
Owens this data - it's public domain. We should be able to access it and give feedback when it's incorrect.



Software Developers

Need accurate, reliable sources of data, and prefer not to DIY everything.

Recording streets in OpenStreetMap



Just draw streets where they are



What kind of data do we need?



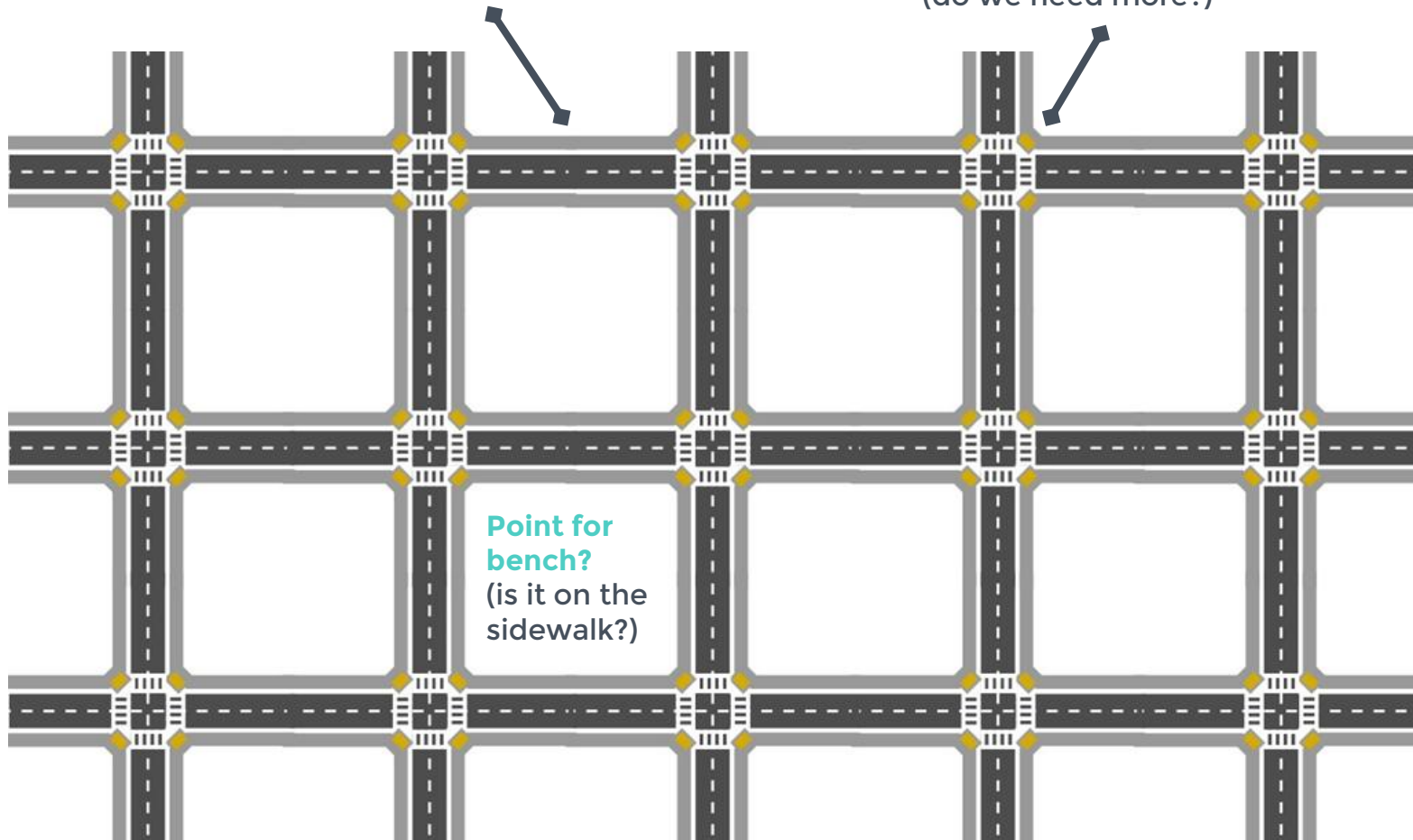
Sidewalks	Curb Ramps	Crossings	Street furniture	...
Exact shape	Location	Exact shape	Benches	
Width	Type	Crosswalk?	?	
Surface		Low-vision?		
Curb				

How should we model that data?



Lines for sidewalks?
(what about width?)

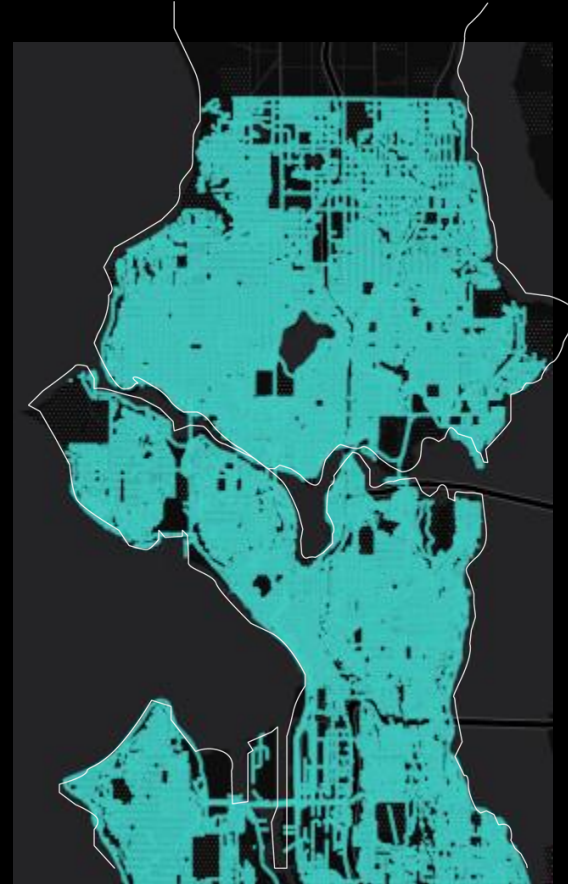
Points for curb ramps?
(do we need more?)



The 'import' opportunity: SDOT



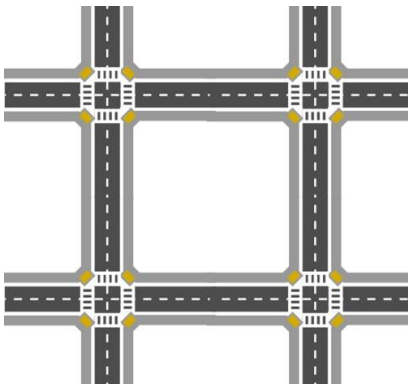
Current OSM sidewalk
coverage



Sidewalk coverage with
Seattle open data

How do we get the data?

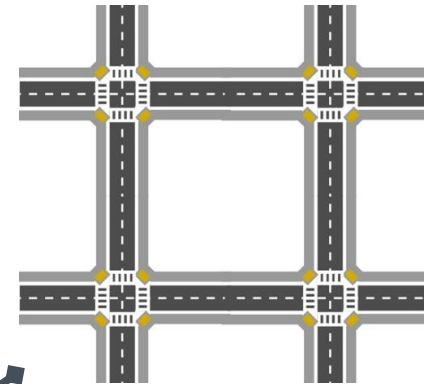
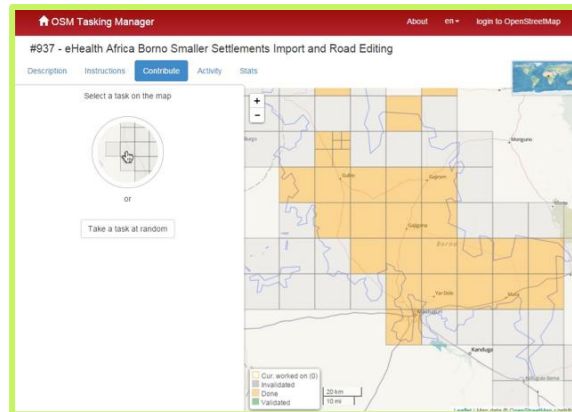
We'd like data according to this glorious new specification, please!



Okay! Here's incomplete records in 8 different file formats



How do we get the data?



Import tool

Goals



- Develop a data model for sidewalks + related data in OpenStreetMap.
- Present that data model to the community (SOTMUS, official online mailing lists).
- Develop a import tools (likely based on the Tasking Manager) that consumes different data formats.
- Import data from Seattle, Denver, and Savannah (GA) into a private (or public!) OSM data layer.
- (Stretch goal: analyze the data)

3.

Results

What we've
done this
summer

What we've done



- Settled on a data specification
- Went to the SOTMUS conference and gave a talk (and met cool like-minded people)
- Proposed our specification using the official channels: mailing lists
- Ran a map-a-thon to map UW campus according to our spec and developed customized tooling (that are also part of the import tool)
- Acquired important new stakeholders
- Have begun the import process (!)

**How is sidewalk data
currently being mapped?**

Recording streets in OpenStreetMap



Just draw streets where they are



Recording sidewalk data in OpenStreetMap

Sidewalks



Sidewalks hidden as a tag of the street:
sidewalk=left/right/both/no

Recording sidewalk data in OpenStreetMap



Kerb ramps



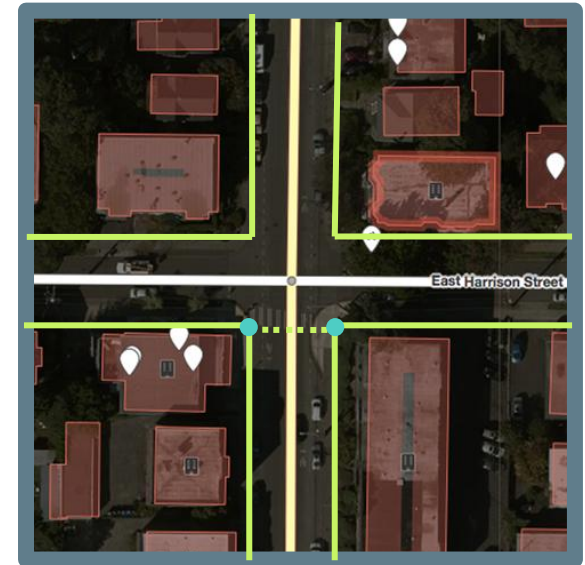
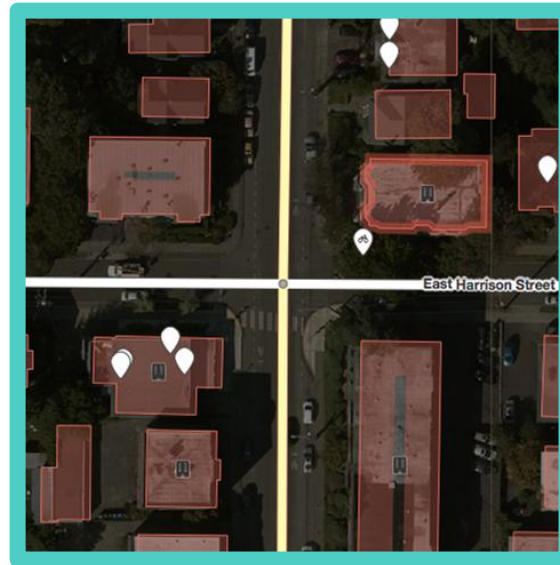
Add a new point, label as crossing, label as a kerb.

Sidewalks as lines

Crossings as lines

Kerb-cuts as points

An expressive and intuitive solution with a minimal set of changes



E Harrison St & 12th Ave E Seattle, WA

Gave a talk at SOTMUS 2016



Presented our specification to the community (opensidewalks.com)

Some grumpy responses:

“I'm not a friend of separately mapped sidewalks but I can live with people mapping them if they desire.”

- Frederik

Mostly friendly / useful responses:

“I completely agree with the current lack of consistency and would like to encourage the search of better description and network approach.”

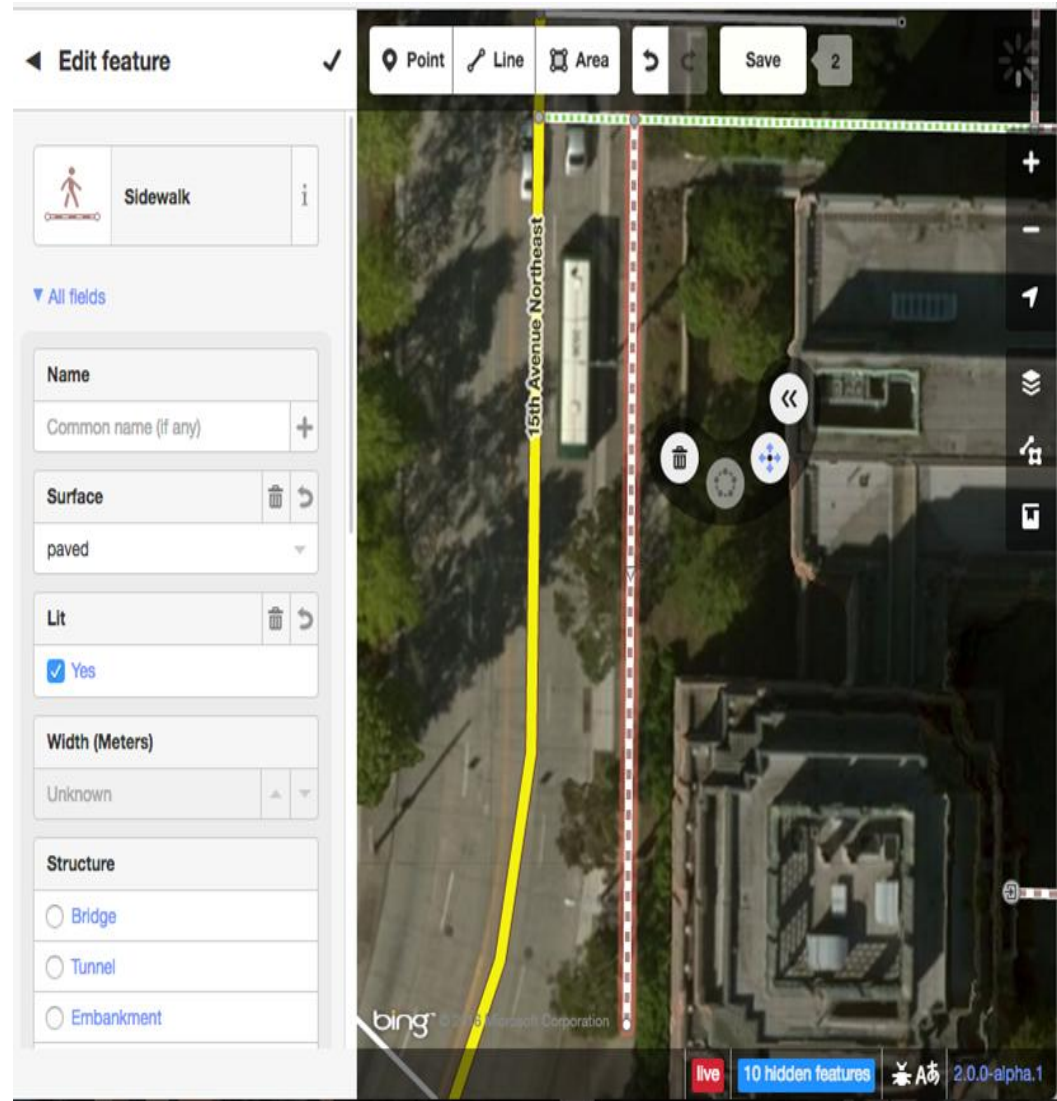
- François

We had a Map-a-thon!



Custom iD Editor

- Forked from existing iD Editor
- Added custom presets
- Running on AWS



Custom Tasking Manager

- Forked from existing Tasking Manager
- Launch custom iD Editor
- Setting up seattle sidewalk import
- Running on AWS

The screenshot displays the OSM Tasking Manager web interface. At the top, a red navigation bar contains the site logo, language options (About, English), and a login link. The main content area is titled 'Projects' and features a search bar and a 'Sort by: High priority first' dropdown. Three project cards are listed, each with a title, description, progress indicator, and a world map thumbnail. The first project is '#7 San Fernando Valley LA City - LABuildings Import' (100% complete, urgent priority). The second is '#6 Central and Eastside LA City - LABuildings Import' (100% complete, urgent priority). The third is '#3 The Westside LA City - LABuildings Import' (100% complete, medium priority). To the right of the projects, there are three informational sections: 'About the Tasking Manager' explaining its purpose for the LA County building import, 'New to Mapping?' with a tutorial link, and 'Questions about this project?' with links to GitHub issues and a Gitter chat room.

OSM Tasking Manager

About English login to OpenStreetMap

Projects

Search

Sort by: High priority first

#7 San Fernando Valley LA City - LABuildings Import 100%

For Los Angeles City building import, details in:

- Github
- OSM wiki

Created by manings - Updated 3 minutes ago - Priority: urgent

#6 Central and Eastside LA City - LABuildings Import 100%

For Los Angeles City building import, details in:

- Github
- OSM wiki

Created by manings - Updated 6 days ago - Priority: urgent

#3 The Westside LA City - LABuildings Import 100%

Created by manings - Updated 30 days ago - Priority: medium

About the Tasking Manager

This Tasking Manager is a custom deployment for coordinating the LA County building import. More information about this import is on the [OpenStreetMap wiki](#) and on [Github](#).

OSM Tasking Manager is a mapping tool designed and built for the Humanitarian OSM Team collaborative mapping. The purpose of the tool is to divide up a mapping job into smaller tasks that can be completed rapidly. It shows which areas need to be mapped and which areas need their mapping validated.

This approach helps us monitor the progress and the homogeneity of the work done (ie. which elements to cover, specific tags to use, etc.).

New to Mapping?

Just jump over to [OpenStreetMap](#), create an account, and then visit [this tutorial](#). Then come back here to help map for people on the ground!

Questions about this project?

If you have any questions about the import process, please open an issue on Github: <https://github.com/osmlab/labuildings/issues>

Or ask a question in the gitter chat room: <https://gitter.im/osmlab/labuildings>



Carrier 2:49 PM

[GPS Marker](#) User Credential

Give all your contributions a unique ID
so that we know who you are

User ID:

ID Type: ☒ Arbitrary ID ☐ OpenStreetMap ID

Email:

Save

Carrier 1:58 PM

GPS Marker

Current GPS Info
Long: -122.0312186 degree
Lat: 37.33233141 degree
Alt: 0.0 meters

GPS Accuracy
Horizontal: 10.0 meters
Vertical: -1.0 meters

Sidewalk
Curb Ramp
Other

Login Upload Record Clear Cache

Crowdsource contribution app

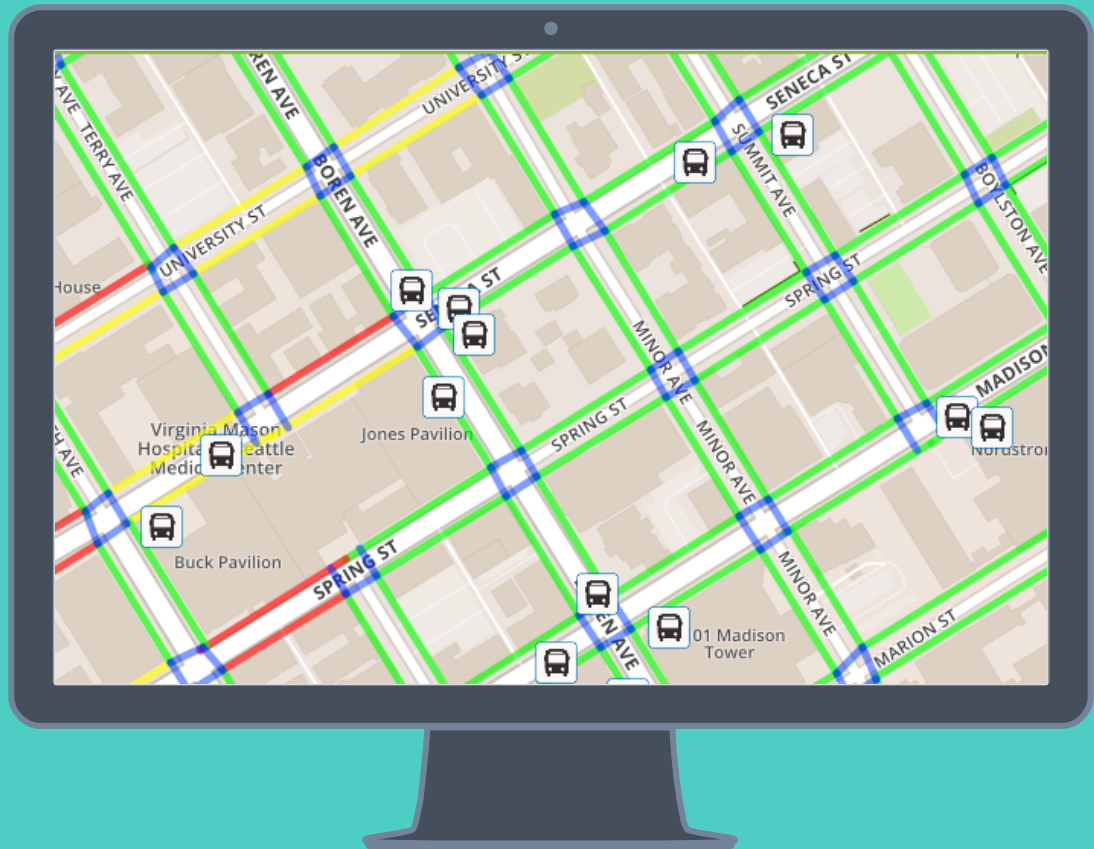
We built a simple app that allows people to trace sidewalks while they walk through the urban environment.

Import: in progress

4.

Going Forward

What we're
doing next



AccessMap Seattle

Will use OSM instead, enable users to contribute back data - is there really a curb ramp at that intersection?

Will begin to have a global impact.

KC Metro

ADA compliance group will begin testing OSM-based surveys - they pay people to go check on accessibility conditions, will use OSM instead and now that data will go back to the community.

TriMet

Is evaluating our model for use in the Portland area.

PSRC

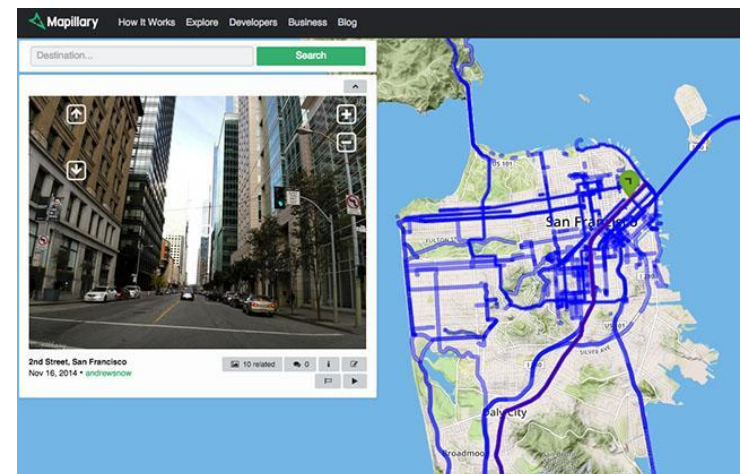
Is interested in using OSM for sharing sidewalk data across the Puget Sound region

The future of open mapping: massive, passive data

Drones



Phones



Thanks!

Any questions?



TCAT The Taskar Center for
Accessible Technology



UNIVERSITY of WASHINGTON
eScience Institute
DATA SCIENCE FOR SOCIAL GOOD